

From the INTERNATIONAL BUREAU

PCT**NOTIFICATION OF ELECTION**

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 18 April 2000 (18.04.00)	
International application No. PCT/JP99/04903	Applicant's or agent's file reference 98-00382WO1
International filing date (day/month/year) 09 September 1999 (09.09.99)	Priority date (day/month/year) 10 September 1998 (10.09.98)
Applicant TANABE, Tetsuhiro et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

03 April 2000 (03.04.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer R. Forax Telephone No.: (41-22) 338.83.38
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT-6 2001

(PCT Article 36 and Rule 70)

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TC 2800 MAIL ROOM

Applicant's or agent's file reference 98-00382WO1	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP99/04903	International filing date (day/month/year) 09 September 1999 (09.09.99)	Priority date (day/month/year) 10 September 1998 (10.09.98)
International Patent Classification (IPC) or national classification and IPC H01L 33/00, 21/363, 21/365, H01S 5/327, 5/347		
Applicant ROHM CO., LTD.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 03 April 2000 (03.04.00)	Date of completion of this report 15 November 2000 (15.11.2000)
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP99/04903

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
pages 1-115, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☒ the claims:
pages 2-4,6-26,30-39,43,44,48-56,58-65, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages 1,5,40-42, filed with the letter of 04 September 2000 (04.09.2000)
- ☒ the drawings:
pages 1-28, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☒ the claims, Nos. 27-29,45-47,57
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	1-26, 30-44, 48-56, 58-65	YES
	Claims		NO
Inventive step (IS)	Claims	2-26, 30-44, 48-56, 58-65	YES
	Claims	1	NO
Industrial applicability (IA)	Claims	1-26, 30-44, 48-56, 58-65	YES
	Claims		NO

2. Citations and explanations

Claim 1

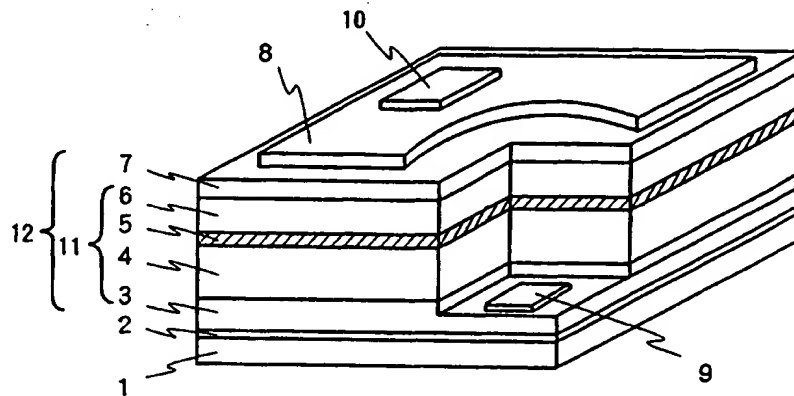
Document 1 (JP, 9-162500, A (Sony Corp.), June 20, 1997 (20.06.97), paragraphs 0025-0026) discloses a semiconductor light-emitting element which uses a II-IV group compound semiconductor comprising at least one type or more of II group elements selected from a group consisting of Zn, Mg, Cd, Hg and Be and at least one type or more of IV group elements selected from a group consisting of Se, S, Te and O, wherein the lattice constant of the active layer and the lattice constant of the substrate are made to be approximately equal.

The embodiments of Document 1 indicate that GaAs is used as the aforementioned substrate material and ZnCdOS is used as the active layer material, but paragraph 0050 of Document 1 also indicates that a variety of materials can be used as the substrate material. Moreover, Fig. 2 of Document 1 shows the lattice constant of a material containing ZnO and its mixed crystal. Therefore, it would be obvious to a person skilled in the art to devise a semiconductor light-emitting element using as the active layer material a semiconductor material of ZnO or a material with ZnO as its main element in line with the lattice constants of each of the substrate materials.

(51) 国際特許分類6 H01L 33/00, 21/363, 21/365, H01S 3/18		A1	(11) 国際公開番号 WO00/16411
			(43) 国際公開日 2000年3月23日(23.03.00)
(21) 国際出願番号 PCT/JP99/04903		(71) 出願人 (米国を除くすべての指定国について) ローム株式会社(ROHM CO., LTD.)(JP/JP) 〒615-8585 京都府京都市右京区西院溝崎町21番地 Kyoto, (JP)	
(22) 国際出願日 1999年9月9日(09.09.99)		(72) 発明者 ; および (75) 発明者 / 出願人 (米国についてののみ) 田辺哲弘(TANABE, Tetsuhiro)(JP/JP) 中原 健(NAKAHARA, Ken)(JP/JP) 〒615-8585 京都府京都市右京区西院溝崎町21番地 ローム株式会社内 Kyoto, (JP)	
(30) 優先権データ		(74) 代理人 河村 洸(KAWAMURA, Kiyoshi) 〒532-0011 大阪府大阪市淀川区西中島4丁目5番1号 新栄ビル6E 河村特許事務所 Osaka, (JP)	
特願平10/257167	1998年9月10日(10.09.98)	JP	(81) 指定国 CA, CN, JP, KR, US, 欧州特許 (DE, FR, GB, IT, NL)
特願平10/274026	1998年9月28日(28.09.98)	JP	
特願平10/320909	1998年11月11日(11.11.98)	JP	
特願平10/320910	1998年11月11日(11.11.98)	JP	
特願平10/324004	1998年11月13日(13.11.98)	JP	
特願平10/328269	1998年11月18日(18.11.98)	JP	
特願平10/328271	1998年11月18日(18.11.98)	JP	
特願平10/328272	1998年11月18日(18.11.98)	JP	
特願平10/328273	1998年11月18日(18.11.98)	JP	
特願平10/361557	1998年12月18日(18.12.98)	JP	
特願平10/361559	1998年12月18日(18.12.98)	JP	
特願平10/361561	1998年12月18日(18.12.98)	JP	
特願平10/361562	1998年12月18日(18.12.98)	JP	
特願平11/5678	1999年1月12日(12.01.99)	JP	
特願平11/24168	1999年2月1日(01.02.99)	JP	添付公開書類 国際調査報告書
特願平11/24169	1999年2月1日(01.02.99)	JP	

(54) Title: SEMICONDUCTOR LIGHT-EMITTING DEVICE AND METHOD FOR MANUFACTURING THE SAME

(54) 発明の名称 半導体発光素子およびその製法



(57) Abstract

A semiconductor light-emitting device has a structure where an active layer (5) which emits light when current is injected and has a composition of, e.g., $\text{Cd}_x\text{Zn}_{1-x}\text{O}$ ($0 \leq x < 1$) is sandwiched between an n-type clad layer (4) and a p-type clad layer (6) both made of materials having band gaps wider than that of the active layer (5). It is preferable that the composition of the clad layers (4, 6) is, e.g., $\text{Mg}_y\text{Zn}_{1-y}\text{O}$ ($0 \leq y < 1$). The band gap of the ZnO material is narrowed. The materials of the active layer and clad layers of a semiconductor light-emitting device such as a blue light-emitting diode or laser diode in which an active layer is sandwiched between clad layers can be an oxide semiconductor which can be wet-etched, easily handled, and excellent in crystallinity, thereby providing a blue light-emitting device excellent in light emission characteristics.